

gine wear, perform an engine leak down test. Refer to *Cylinder Leak Down Test* in this chapter.

1. Cylinder and cylinder head:
  - a. Loose spark plug.
  - b. Missing spark plug gasket.
  - c. Leaking cylinder head gasket.
  - d. Leaking cylinder base gasket.
  - e. Worn or seized piston, piston rings and/or cylinder.
  - f. Loose cylinder and/or cylinder head fasteners.
  - g. Cylinder head incorrectly installed and/or torqued.
  - h. Warped cylinder head.
  - i. Valve(s) adjusted too tight.
  - j. Bent valve.
  - k. Worn valve and/or seat.
  - l. Worn or damaged valve guide(s).
  - m. Damaged compression release cam (mounted on camshaft).
  - n. Bent pushrod(s).
  - o. Damaged cam follower.
2. Piston and piston rings:
  - a. Worn piston rings.
  - b. Damaged piston rings.
  - c. Piston seizure or piston damage.
3. Crankcase and crankshaft:
  - a. Seized connecting rod.
  - b. Damaged crankcases.

### POOR IDLE SPEED PERFORMANCE

If the engine starts, but off-idle performance is poor (engine hesitates or misfires), check the following:

1. Clogged or damaged air filter element.
2. Carburetor:
  - a. Plugged pilot jet.
  - b. Loose pilot jet.
  - c. Damaged choke system.
  - d. Incorrect throttle cable adjustment.
  - e. Incorrect pilot screw adjustment.
  - f. Flooded carburetor (visually check carburetor overflow hose for fuel).
  - g. Vacuum piston does not slide smoothly in carburetor bore.
  - h. Loose carburetor.
  - i. Damaged intake tube O-ring.
3. Fuel:
  - a. Water and/or alcohol in fuel.

- b. Old fuel.
4. Engine:
  - a. Low engine compression.
5. Electrical system:
  - a. Damaged spark plug.
  - b. Damaged ignition coil.
  - c. Damaged ignition pulse generator.
  - d. Damaged ICM unit.
  - e. On early 2000 FE and TE models, damaged sub-ICM unit.

### POOR MEDIUM AND HIGH SPEED PERFORMANCE

Refer to *Engine is Difficult to Start*, then check the following:

1. Carburetor:
  - a. Incorrect fuel level.
  - b. Incorrect jet needle clip position.
  - c. Plugged or loose main jet.
  - d. Plugged fuel line.
  - e. Plugged fuel valve.
  - f. Plugged fuel tank vent tube.
2. Plugged air filter element.
3. Engine:
  - a. Incorrect valve timing.
  - b. Weak valve springs.
4. Other considerations:
  - a. Overheating.
  - b. Clutch slippage.
  - c. Brake drag.
  - d. Engine oil level too high.

### ELECTRIC STARTING SYSTEM

This section describes troubleshooting procedures for the electric starting system. A fully charged battery, ohmmeter and jumper cables are required to perform many of these troubleshooting procedures.

#### Description

An electric starter (**Figure 12**) is used on all models. The starter is mounted horizontally at the rear of the engine.

The electric starting system requires a fully charged battery to provide the large amount of current required to operate the starter. A charge coil (mounted on the stator plate) and a voltage regula-

tor, connected in circuit with the battery, keeps the battery charged while the engine is running. The battery can also be charged externally.

The starting circuit consists of the battery, starter, neutral/reverse switch, neutral indicator, starter relay, ignition switch and engine stop switch.

The starter relay (**Figure 13**) carries the heavy electrical current to the starter. Depressing the starter switch allows current to flow through the starter relay coil. The starter relay contacts close and allow current to flow from the battery through the starter relay to the starter.

When the ignition switch is turned on and the engine stop switch is in the run position, the starter can be operated only if the transmission is in neutral.

#### CAUTION

*Do not operate the starter continuously for more than 5 seconds. Allow the starter to cool for at least 10 seconds between attempts to start the engine.*

### Preliminary Troubleshooting

Before troubleshooting the starting circuit, make sure:

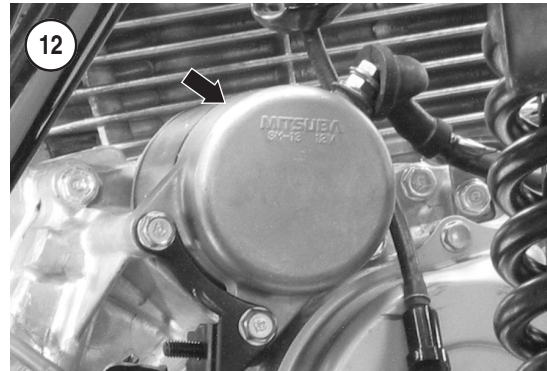
1. The battery is fully charged.
2. Battery cables are the proper size and length. Replace cables that are undersize or damaged.
3. All electrical connections are clean and tight.
4. The wiring harness is in good condition, with no worn or frayed insulation or loose harness sockets.
5. The fuel system is filled with an adequate supply of fresh gasoline.

### Starter Does Not Operate

If the starter does not operate, perform the following tests.

When operating the starter switch, turn the engine stop switch to run and the ignition switch to on. Make sure the transmission is in neutral.

1. Refer to Chapter Fifteen and remove the following components to access the starting circuit in this procedure.
  - a. Seat.
  - b. Air cleaner housing.
2. First check the 30-amp main fuse. Open the fuse holder, pull out the fuse and visually inspect it. If the fuse is blown, replace it as described in *Fuses* in



Chapter Nine. If the main fuse is good, reinstall it, then continue with Step 3.

3. Test the battery as described in *Battery* in Chapter Three. Note the following:

- a. If the battery is fully charged, perform Step 4.
- b. If necessary, clean and recharge the battery. If the battery is damaged, replace it.

4. Check for loose, corroded or damaged battery cables. Check at the battery, starter, starter relay and all cable-to-frame connections.

5. Turn the ignition switch on, then push the starter button and listen for a click sound at the starter relay switch (**Figure 13**). Note the following:

- a. If the relay clicked, perform Step 6.
- b. If the relay did not click, go to Step 7.

6. Test the battery as follows:

- a. Park the ATV on level ground and set the parking brake. Shift the transmission into neutral.
- b. Disconnect the cable from the starter (**Figure 12**).

#### WARNING

*Because a spark will be produced in the following steps, perform this procedure away from gasoline or other volatile liquids. Make sure there is no spilled gasoline or gasoline fumes in the work area.*

- c. Momentarily connect a jumper cable (thick gauge wire) from the positive battery terminal to the starter terminal. If the starter is working properly, it will turn when the jumper cable connection is made.
- d. If the starter did not turn, remove the starter and service it as described in Chapter Nine.



- e. If the starter turned, check for a loose or damaged starter cable. If the cable is good, the starter relay (**Figure 13**) is faulty. Replace the starter relay and retest.
7. Test the following items as described in Chapter Nine:
  - a. Neutral/reverse switch.
  - b. Ignition switch.
  - c. Diode.
8. Perform the starter relay switch voltage test as described in *Starter Relay Switch* in Chapter Nine. Note the following:
  - a. If the voltmeter shows battery voltage, continue with Step 9.
  - b. If there was no voltage reading, check the ignition switch and starter switch as described in Chapter Nine. If both switches are good, check the continuity of the yellow/red wire between the starter switch and the starter relay switch.
9. Perform the starter relay switch continuity test as described in *Starter Relay Switch* in Chapter Nine. Note the following:
  - a. If the meter reading is correct, continue with Step 10.
  - b. If the meter reading is incorrect, check for an open circuit in the yellow/red and light green/red wires. Check the wire ends for loose or damaged connectors.
10. If the starting system problem was not found after performing these steps in order, recheck the wiring system for dirty or loose-fitting terminals or damaged wires; clean and repair as required.
11. Make sure all connectors disconnected during this procedure are free of corrosion and reconnected properly.

### Starter Turns Slowly

If the starter turns slowly and all engine components and systems are normal, perform the following:

1. Test the battery as described in Chapter Three.
2. Check for the following:
  - a. Loose or corroded battery terminals.
  - b. Loose or corroded battery ground cable.
  - c. Loose starter cable.
3. Remove, disassemble and bench test the starter as described in *Starter* in Chapter Nine.
4. Check the starter for binding during operation. Disassemble the starter and check the armature shaft for bending or damage. Also, check the starter clutch as described in Chapter Five.

### Starter Turns but the Engine Does Not

If the starter turns but the engine does not, perform the following:

1. Check for a damaged starter clutch (Chapter Five).
2. Check for damaged starter reduction gears (Chapter Five).

## CHARGING SYSTEM

The charging system consists of the battery, alternator and a voltage regulator/rectifier. A 30-amp main fuse protects the circuit.

A malfunction in the charging system generally causes the battery to remain undercharged.

### Battery Discharging

1. Check all of the connections. Make sure they are tight and free of corrosion.
2. Perform the *Charging System Current Draw Test* as described in Chapter Nine. Note the following:
  - a. On FE and TE models, if the current draw exceeds 1.0 mA, perform Step 3. If the current draw is 1.0 mA or less, perform Step 4.
  - b. On FM and TM models (no digital combination meter), if the current draw exceeds 0.1 mA, perform Step 3. If the current draw is 0.1 mA or less, perform Step 4.
  - c. On FM and TM models (with digital combination meter), if the current draw exceeds 1.0

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